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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,560	05/20/2005	Gebhard Zobl	SB-514	4363

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EXAMINER
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KEMMERLE III, RUSSELL J

ART UNIT	PAPER NUMBER
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1731

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07/06/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/533,560	<b>Applicant(s)</b> ZOBL ET AL.	
	<b>Examiner</b> Russell J. Kemmerle	<b>Art Unit</b> 1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 May 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US Patent 6,660,420) in view of Koga (US Patent 6,517,338) and Quadakkers (US Patent 5,733,682).

Yoshida discloses a method for forming a separator (i.e., an interconnector) for a fuel cell comprising a two step pressing operation. The process includes pressing the powder to a shape similar to a final desired shape to create a preliminary molded member, then further pressing the preliminary molded member to create a molding of the final desired shape (Col 4 lines 12-16). The separator is generally plate-like with a plurality of knob like protrusions (See Fig. 1). While the angle of inclination is not specifically given, it appears from the drawings to be approximately 90° (see Figs. 3, 4B and 6). Yoshida further discloses that the dimensions of the preliminary molded member in the direction of the molding pressure (i.e., the height of the knobs) are about 1 to 2 times the dimensions of the final molded member.

Yoshida does not disclose that in the second pressing steps the angle of inclination is increased to between 95° and 170°.

Koga teaches a method of pressing a powder into a desired shape using a set of molding dies to create a fuel cell separator having a number of protrusions extending from the base plate of the separator. Koga discloses that the dies include holes used to

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form the protrusions which could have an inside wall that is not perpendicular to the other surface, but is instead inclined at a given angle so that the diameter of a protrusion would decrease as it moved away from the base plate (Col 5 lines 7-21). The angle of inclination formed between the base plate and the protrusion is stated as preferably being between  $91^\circ$  and  $100^\circ$  (Col 5 lines 14-15), and appears to be approximately  $105^\circ$  in Fig. 6, however Koga further notes that inclined walls of the die need only to have a inclined (i.e., not perpendicular) inside wall, and that any inclination or shape (i.e., the walls do not need to be linear) would work (Col 5 lines 18-21).

Yoshida and Koga do not disclose that the powder used be selected from the group consisting of metallic and ceramic materials, and specifically be an alloy having at least 20 wt% of chromium (Cr) component (claim 13), or that the alloy contain Cr, iron (Fe) and one or more metallic or ceramic alloy of at most 40 wt%.

Quadakkers discloses a bipolar plate (i.e., interconnector or separator) for a fuel cell and a metal and ceramic composition of the same which must be sintered to obtain the final product. One composition specifically disclosed by Quadakkers include (all percentages given are based on weight) 20% Cr, 5% aluminum (Al), 0.5% Yttrium Oxide ( $Y_2O_3$ ), balance (74,5%) Fe, this composition is said to have superior corrosion resistance (Col 2 lines 1-3, 13-14, see also claim 6).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of forming a fuel cell separator by a two step pressing process as taught by Yoshida with the second pressing step reducing oversized knobs down to a final desired size, with the fuel cell separator pressing

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process taught by Koga where the angle of inclination between the base plate and the knob-like protrusion is greater than  $90^\circ$ , since Koga discloses that having such an angle makes it easier to release the pressed piece from the die (Col 5 lines 20-21).

It would have been further obvious to one of ordinary skill in the art at the time of invention by applicant to use the composition taught by Quadakkers and discussed above in the process of Yoshida and Koga since Quadakkers discloses that such a composition is effective as a fuel cell separator and creates a separator with increased corrosion resistance. One would have been motivated to do so since all three references are directed toward an interconnector of a fuel cell, and Yoshida and Koga discuss the advantages of using near final shape press molding to create the interconnector, while Quadakkers discloses the advantages of using the material discussed above in creating such an interconnector.

Referring to claim 11, Yoshida and Koga do not specifically disclose that the angle of inclination between the base plate and the knob-protrusions after the first pressing be between  $110^\circ$  and  $130^\circ$ , and be increased by the second pressing to between  $115^\circ$  and  $160^\circ$ . However, it would have been obvious to one of ordinary skill in the art at the time of invention by applicant that the angle of inclination taught by Koga, as discussed above, would include angles in both of those ranges. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga

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Referring to claim 12, Yoshida and Koga do not specifically disclose a pre-sintering step after the first pressing stage. It is well known in the art that when a powder is pressed which include known additives to assist in forming the mold (such as a binder or lubricant), that these materials should be burned off prior to sintering by heating the molding to a at temperature which those additives volatilize and are thus removed from the molded piece. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant that when a powder which uses additives is used to form the molding, that a pre-sintering step be used to remove those additives after the piece is molded and before the piece is finally sintered.

Referring to claim 15, Yoshida, Koga and Quadakkers are relied upon as discussed above, further they all discuss where the molding produced is an interconnector or separator for a fuel cell.

### ***Response to Arguments***

Applicant's arguments filed 10 May 2007 have been fully considered but they are not persuasive.

Applicant argues that Yoshida is entirely different from the claimed process in that the claimed process uses powder mixtures that are very difficult to press, and that Quadakkers discloses that the only methods available for creating an interconnector for a fuel cell using chromium-containing alloys are MIM (metal injection molding) or WPP (wet powder pouring), both of which have known disadvantages (i.e., high content of binder which leads to shrinkage and/or pore formation).

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This argument is not persuasive because one of ordinary skill in the art would not be precluded from carrying out a process simply because it is "very difficult". One of ordinary skill in the art would weigh the difficulty of such a process against the advantage obtained by overcoming that difficulty (be it through increased energy costs, more expensive materials, or other problems), and when the advantages outweigh the difficulty one of ordinary skill would proceed with that method even though it may be extremely difficult.

Quadakkers discloses the known methods of making a Cr-containing alloy fuel cell interconnector that were known and chosen to be included in that publication. There is nothing in Quadakkers that suggests that the press molding processes of Yoshida and Koga could not be used for forming such an interconnector. Since Yoshida, Koga and Quadakkers are all directed toward forming a fuel cell interconnector, one of ordinary skill in the art would have been motivated to combine them in order to combine the best properties of each into an improved interconnector.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not


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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
STEVEN P. GRIFFIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700



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/RJK/